

Incidence of indications for tonsillectomy and frequency of evidence-based surgery:

a 12-year retrospective cohort study of primary care electronic records

Abstract

Background

Neither the incidence of indications for childhood tonsillectomy nor the proportion of tonsillectomies that are evidence-based is known.

Aim

To determine the incidence of indications for tonsillectomy in UK children, and the proportion of tonsillectomies meeting evidence-based criteria.

Design and setting

A retrospective cohort study of electronic medical records of children aged 0–15 years registered with 739 UK general practices contributing to a research database.

Method

Children with recorded indications for tonsillectomy were identified from electronic medical records. Evidence-based indications included documented sore throats of sufficient frequency and severity (Paradise criteria); periodic fever, aphthous stomatitis, pharyngitis, and cervical adenitis syndrome (PFAPA); or tonsillar tumour. Other indications were considered non-evidence-based. The numbers of children subsequently undergoing tonsillectomy was then identified. The numbers with evidence-based and non-evidence-based indications for surgery among children who had undergone tonsillectomy were determined.

Results

The authors included 1 630 807 children followed up for 7 200 159 person-years between 2005 and 2016. Incidence of evidence-based indications for tonsillectomy was 4.2 per 1000 person years; 13.6% (2144/15 760) underwent tonsillectomy. Incidence of childhood tonsillectomy was 2.5 per 1000 person years; 11.7% (2144/18 281) had evidence-based indications, almost all with Paradise criteria. The proportion of evidence-based tonsillectomies was unchanged over 12 years. Most childhood tonsillectomies followed non-evidence-based indications: five to six sore throats (12.4%) in 1 year, two to four sore throats (44.6%) in 1 year, sleep disordered breathing (12.3%), or obstructive sleep apnoea (3.9%).

Conclusion

In the UK, few children with evidence-based indications undergo tonsillectomy and seven in eight of those who do (32 500 of 37 000 annually) are unlikely to benefit.

Keywords

children; evidence-based medicine; primary care; tonsillectomy.

INTRODUCTION

Tonsillectomy is the most common surgical procedure in children. Tonsillectomy rates in Belgium, Finland, and Norway are twice the UK rate, but in Spain, Italy, and Poland rates are much lower.¹ Childhood tonsillectomy rates in the US are three times higher than in England,^{2,3} rates vary fourfold within New England, and sevenfold within England (UK).^{4,5} These variations are hard to explain in terms of need. The NHS carried out approximately 37 000 childhood tonsillectomies from April 2016 to March 2017, at a cost of £42 million.^{2,6}

Complications of tonsillectomy are more common than with other common childhood surgical procedures: 2.7% of children are readmitted within 30 days, and 12.4% present to emergency departments, often as a result of haemorrhage.⁷ Deaths occur occasionally.⁸ Tonsillectomy may have long-term effects on the frequency of respiratory, infectious, and allergic conditions.⁹

Recurrent or chronic sore throat is the most common indication for tonsillectomy in the UK.¹⁰ Evidence indicates tonsillectomy results in modest, short-term reductions in recurrent sore throats in severely affected children (aged 3–15 years), but is not worthwhile in less severely affected children.^{11–13} UK and US evidence-based guidelines therefore suggest offering tonsillectomy for children with seven or more documented sore throats in 1 year;

five or more yearly in 2 successive years; or three or more yearly in 3 successive years: the Paradise criteria.^{2,14,15} Sore throats should be characterised by at least one of the following: lymphadenopathy, tonsillar pus, fever, or evidence of streptococcal infection. As undocumented sore throats have a more benign prognosis, eligibility requires documentation.¹⁶ The evidence base has not fundamentally changed since 2002.^{17,18} Tonsillectomy may also be carried out for tonsillar tumour. It may be effective in periodic fever, aphthous stomatitis, pharyngitis, and cervical adenitis syndrome (PFAPA).¹⁹

Other potential indications for tonsillectomy lack convincing evidence. Only uncontrolled studies have evaluated tonsillectomy for recurrent peritonsillar abscess.²⁰ Adenotonsillectomy results in short-term improvements in quality of life in children aged 5–9 years with polysomnography-confirmed obstructive sleep apnoea.²¹ However, its long-term value is debatable; tonsillectomy is unevaluated for snoring, and of limited effectiveness for sleep apnoea unconfirmed by polysomnography.¹³ Trials of tonsillectomy for sleep apnoea are ongoing.^{22–24} Only very small non-randomised studies have evaluated tonsillectomy for guttate or chronic plaque psoriasis in children.²⁵ Randomised controlled trial evidence does not show that tonsillectomy affects clinical remission

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How this fits in

Evidence suggests tonsillectomy is effective in children with frequent, documented sore throats but not in less severely affected children, and there is insufficient evidence to recommend its use for breathing difficulties. The authors found that each year between 2005 and 2016, about four in 1000 UK children had sufficient sore throats to meet evidence-based criteria for tonsillectomy, but only about one in seven ever had the operation. This suggests tonsillectomy is far from essential. Over the same time period, two to three in 1000 children underwent tonsillectomy each year; of these one in eight met evidence-based criteria, amounting to about 32 500 unnecessary tonsillectomies annually, at a cost of £36.9 million.

of glomerulonephritis.²⁶

No previous population-wide study has described the epidemiology of potential indications for tonsillectomy, or how many of those with different potential indications undergo tonsillectomy. This analysis therefore has three aims: to describe the incidence of potential indications for tonsillectomy in children; to determine the proportion of children undergoing tonsillectomy who met evidence-based criteria; and to investigate if there have been changes in the potential indications over time. The authors hypothesise a mismatch between the evidence base and tonsillectomies performed. Most tonsillectomies are undertaken in children who are not eligible, and many eligible children do not undergo tonsillectomy.

METHOD

Data source and study cohort

This is a retrospective open cohort study of children aged 0–15 years registered with a general practice contributing to The Health Improvement Network (THIN). THIN is a database of anonymised patient records from >700 UK general practices. It contains information on diagnoses, symptoms, referrals to secondary care, tests, and treatments in primary care.²⁷ It is broadly generalisable to the UK population in terms of demographics and medical condition prevalence.^{28,29}

The researchers had complete access to the full THIN database. Data were only included after the date of practice acceptable mortality reporting. This is the date after which patient deregistrations in

each practice were recorded consistently, ensuring that the denominator, the registered population, was accurate.³⁰ Children were eligible for inclusion from birth, or if not registered with a THIN practice from birth, then registered for at least 3 years before entry. This allows sufficient time to meet the evidence-based criteria for tonsillectomy. The earliest year of entry to the cohort was set at 2000.

Children who had a tonsillectomy before entry in the cohort were excluded. Patients were followed up until the earliest of the following dates: age 16 years, death, leaving the practice (deregistration), last data extraction from the practice, or tonsillectomy.

Exposures

Potential indications for tonsillectomy were identified from clinical coded consultations for sore throat episodes, tonsillar neoplasia, PFAPA, peritonsillar abscess, sleep apnoea, other sleep disordered breathing, glomerulonephritis, and guttate and chronic plaque psoriasis. As it is difficult to distinguish new sore throat episodes from ongoing episodes, a pragmatic decision was taken to consider as a new episode any consultation for sore throat (including pharyngitis, tonsillitis, throat infection, or sore throat symptoms) at least 14 days after the previous consultation. Code lists are available from the authors on request. Patients were categorised according to potential indications for tonsillectomy.

In initial analysis, the authors were unable to identify any potential indications for some patients who underwent tonsillectomy. This may have occurred because some consultations for sore throats were recorded using a less specific code, such as another upper respiratory tract infection (URTI). The authors therefore broadened the definition of a sore throat consultation to include any consultations with a clinical code for URTI or otitis media. They also conducted a sensitivity analysis, including in their counts of sore throat episodes any consultations where no code for URTI was used but an oral antibiotic commonly used for sore throat (penicillin V, erythromycin, or clarithromycin) was prescribed.

Incidence of potential indications for tonsillectomy. To calculate the annual incidence of evidence-based indications for tonsillectomy the authors determined the number of children who met at least one evidence-based indication in any given year. Evidence-based indications included: tonsillar neoplasia; PFAPA; seven or more

sore throat episodes in the preceding year, five or more yearly in the 2 preceding years, or three or more yearly in the 3 preceding years (Paradise criteria for sore throats).¹⁴

Proportion of tonsillectomies that are evidence-based. Indications for tonsillectomy were ranked to determine the strongest indication (based first on strength of evidence, then on clinical consensus reflected in current practice), and this was taken to be the true indication for tonsillectomy. Tonsillar neoplasia was considered the strongest indication for tonsillectomy, followed by PFAPA and Paradise criteria for sore throats. These indications for tonsillectomy were considered to be evidence-based. The next strongest indications were considered sequentially to be obstructive sleep apnoea; other sleep disordered breathing; peritonsillar abscess; five or more sore throat episodes recorded in the preceding year but not meeting the Paradise criteria; recurrent sore throat episodes accompanied by guttate or chronic plaque psoriasis, or glomerulonephritis; three to four, two, and one sore throat episodes in the preceding year (the weakest indication).

Initially, the authors considered tonsillectomy to be indicated for 1 year after the patient consulted with the indication. In each child who underwent tonsillectomy they also identified the strongest indication at any time before surgery based on available patient records. This could overestimate the number of tonsillectomies considered evidence-based if an older child had tonsillectomy for an indication that was not evidence-based but they had a previous history of stronger indications.

Changes to the analysis. In initial analysis, when the authors considered tonsillectomy to be indicated only 1 year after the onset of the indication (for example, up to 1 year after the seventh sore throat), no apparent indication could be identified for 19.1% (4406/23 116) of tonsillectomies between 2000 and 2016.

When the authors considered tonsillectomy to be indicated at any time after the indication, the proportion of tonsillectomies with no indication fell to 5.4% (1246/23 116). More than 10% of tonsillectomies had no identifiable indication in the early years of the cohort (10.2% in 2000 and 2001), but this was lower from 2005 onwards. The primary analysis, therefore, allowed indications at any time before tonsillectomy, and was confined to 2005 to 2016.

Outcome

The main outcome of interest was

tonsillectomy or adenotonsillectomy.

Statistical analysis

Incidence of potential indications for tonsillectomy. The annual incidence of potential indications for tonsillectomy was calculated as the number of children who met at least one potential indication for tonsillectomy in each year per person-year of follow-up. The authors then determined the annual incidence of evidence-based indications for tonsillectomy to estimate potential annual need for tonsillectomy.

The strongest indication for tonsillectomy was determined for each child in the cohort, and the proportion of children undergoing tonsillectomy after this strongest indication was calculated.

Incidence of tonsillectomy and indications for tonsillectomies undertaken. The annual incidence of tonsillectomy was estimated as the number of children undergoing the procedure per person-year of follow-up. Incidence estimates were directly standardised to the 2015 UK population³¹ to enable comparisons over time: 95% confidence intervals (CIs) were calculated using Poisson approximation.

For each tonsillectomy, the strongest potential indication at any time before surgery was identified and the proportion of tonsillectomies attributed to each indication determined. Potential indications were then categorised as evidence-based or not evidence-based, and the proportion of evidence-based tonsillectomies calculated. Data were analysed using Stata (version 14).

RESULTS

From 2005–2016 the cohort included 739 general practices, 1 630 807 children aged 0–15 years, 7 200 159 person-years of follow-up, and 18 281 tonsillectomies (Table 1).

Annual incidence of indications for tonsillectomy

Sore throat consultations declined between 2005 and 2016. Incidence of sore throats meeting Paradise criteria (98.0% of evidence-based indications) was 28% lower in 2016 than in 2005 (Table 1). Similarly, consultations for five to six sore throats in a year fell by 27%; for three to four recurrent sore throats by 22%; for two to three sore throats by 19%; and by 13% for a single sore throat. Consultations for peritonsillar abscess also fell by 39%. In contrast, consultations for sleep apnoea rose 48% from 2005 to 2016, and those for sleep disordered breathing increased by 2%

Table 1. Characteristics of the study population, 2005 to 2016

| | Year | | | | | | | | | | | |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Practices, <i>n</i> | 556 | 577 | 603 | 643 | 654 | 648 | 649 | 662 | 644 | 609 | 545 | 451 |
| Children, <i>n</i> | 590 724 | 622 505 | 651 308 | 694 342 | 720 955 | 724 153 | 730 833 | 753 756 | 746 245 | 705 936 | 643 183 | 530 462 |
| Person-years, <i>n</i> | 524 613 | 560 254 | 586 007 | 614 620 | 646 898 | 649 855 | 661 183 | 674 169 | 662 071 | 617 813 | 544 197 | 458 480 |
| Mean age, years | 7.9 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| Males, <i>n</i> (%) | 307 925 (52.1) | 323 551 (52.0) | 337 702 (51.9) | 358 948 (51.7) | 371 608 (51.5) | 372 224 (51.4) | 374 953 (51.3) | 386 071 (51.2) | 381 930 (51.2) | 361 168 (51.2) | 328 770 (51.1) | 271 135 (51.1) |
| Townsend quintile, % ^a | | | | | | | | | | | | |
| Least deprived 1 | 24.4 | 24.8 | 24.8 | 24.2 | 24.1 | 24.0 | 23.4 | 22.6 | 21.9 | 21.3 | 20.5 | 18.6 |
| 2 | 19.2 | 19.2 | 19.2 | 19.5 | 19.6 | 19.5 | 19.4 | 18.9 | 18.5 | 18.4 | 18.3 | 17.4 |
| 3 | 19.2 | 19.0 | 19.1 | 19.4 | 19.6 | 19.6 | 19.7 | 19.6 | 19.5 | 19.7 | 19.4 | 19.0 |
| 4 | 17.2 | 17.1 | 17.0 | 17.0 | 17.2 | 17.2 | 17.3 | 17.6 | 17.8 | 17.7 | 17.8 | 17.4 |
| Most deprived 5 | 12.6 | 12.3 | 12.5 | 12.5 | 12.6 | 12.6 | 12.6 | 13.0 | 13.1 | 13.2 | 13.4 | 13.9 |
| Not known | 7.4 | 7.6 | 7.4 | 7.5 | 6.9 | 7.3 | 7.7 | 8.4 | 9.1 | 9.8 | 10.7 | 13.8 |
| Children with evidence-based indications, ^b <i>n</i> | 2359 | 2483 | 2587 | 2689 | 2699 | 2722 | 2768 | 2864 | 2948 | 2692 | 2155 | 1494 |
| (incidence per 1000 person-years) | (4.5) | (4.4) | (4.4) | (4.4) | (4.2) | (4.2) | (4.2) | (4.2) | (4.5) | (4.4) | (4.0) | (3.3) |
| Tonsillectomies, <i>n</i> | 1555 | 1551 | 1648 | 1620 | 1599 | 1564 | 1468 | 1581 | 1698 | 1598 | 1275 | 1124 |
| (incidence per 1000 person-years) | (3.0) | (2.8) | (2.8) | (2.6) | (2.5) | (2.4) | (2.2) | (2.3) | (2.6) | (2.6) | (2.3) | (2.5) |

^aTownsend score is an area-based measure of deprivation. ^bA child who consults with an evidence-based indication can be eligible for tonsillectomy in more than one calendar year if the indication crossed the calendar year. The total number of children consulting with evidence-based indications over 12 years is therefore smaller than the sum of the number for each year.

Table 2. Numbers of children with potential indications for tonsillectomy, annual incidence of potential indications, and the proportions of these children undergoing tonsillectomy, 2005 to 2016

| Recorded indication for tonsillectomy ^a | | Number with this indication | Proportion with this indication undergoing tonsillectomy, % | Proportion of all tonsillectomies attributable to this indication, % | Average annual incidence of this indication (per 100 000 person-years) |
|--|---|-----------------------------|---|--|--|
| Evidence-based | Tonsillar tumour | 5 | 0.0 | 0.0 | 0.2 |
| | Periodic fever, aphthous stomatitis, pharyngitis and cervical adenitis syndrome (PFAPA) | 435 | 3.4 | 0.1 | 8.5 |
| | Paradise criteria ^b | 15 320 | 13.9 | 11.6 | 412.8 |
| | Obstructive sleep apnoea | 3185 | 22.2 | 3.9 | 65.9 |
| | Other sleep disordered breathing | 15 205 | 14.8 | 12.3 | 369.9 |
| | Peritonsillar abscess | 675 | 14.8 | 0.5 | 14.9 |
| | Recurrent sore throats: five to six in 1 year ^c | 25 420 | 8.9 | 12.4 | 840.4 |
| Non evidence-based | Recurrent sore throats: two to four in 1 year with guttate or chronic plaque psoriasis ^c | 939 | 3.7 | 0.2 | 21.3 |
| | Recurrent sore throats: two to four in 1 year with glomerulonephritis ^c | 148 | 4.7 | 0.0 | 3.5 |
| | Recurrent sore throats: three to four in 1 year ^c | 170 687 | 3.2 | 30.1 | 5869.1 |
| | Recurrent sore throats: two in 1 year ^c | 251 247 | 1.0 | 14.3 | 12 321.6 |
| | Recurrent sore throats: one in 1 year ^c | 446 275 | 0.4 | 9.9 | 27 896.5 |
| | No indication identified | 701 266 | 0.1 | 4.7 | n/a |
| Total | | 1 630 807 | 1.1 | 100.0 | n/a |

^aIf a child meets criteria for several indications, the indication higher in the hierarchy is counted. ^bParadise criteria: Recurrent sore throats or upper respiratory tract infections: seven or more a year; five or more yearly for 2 years; three or more yearly for 3 years. ^cBroad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media. n/a = not applicable.

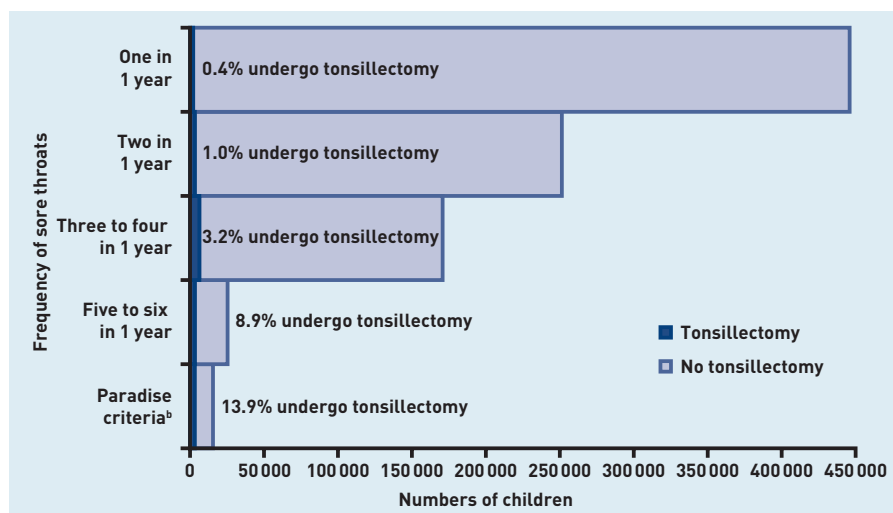
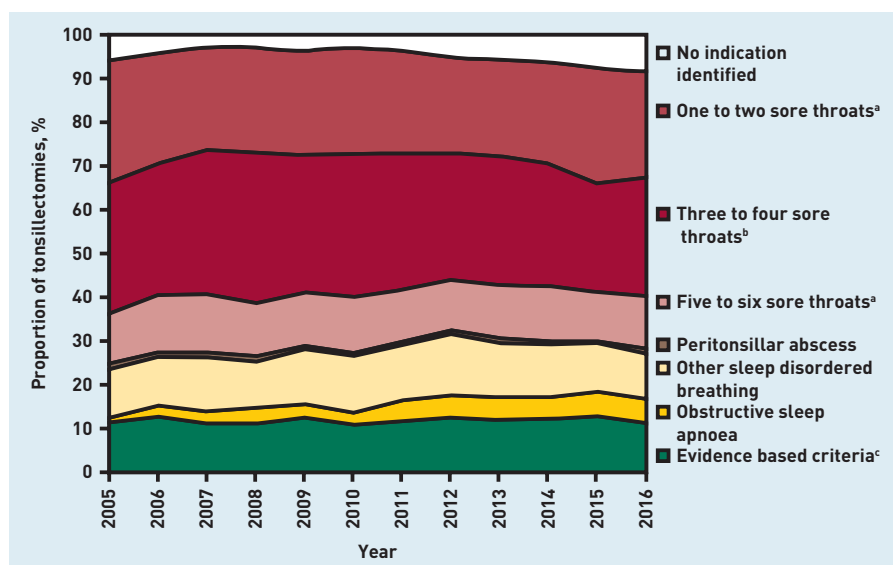


Figure 1. Numbers of children consulting for sore throats,^a and numbers undergoing tonsillectomy, 2005 to 2016. ^aBroad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media. ^bParadise criteria: recurrent sore throats or upper respiratory tract infections: seven or more a year; five or more a year for 2 years; three or more a year for 3 years.

Figure 2. Percentages of tonsillectomies due to different indications, 2005 to 2016. ^aBroad definition of sore throat: includes consultations for any upper respiratory tract infection or otitis media. ^bThree to four sore throats includes children with guttate, chronic plaque psoriasis, and glomerulonephritis with recurrent sore throats (these, however, accounted only for 0.5% of all children in this group of recurrent sore throats who had tonsillectomy). ^cEvidence-based criteria include Paradise criteria, PFAPA (periodic fever, aphthous stomatitis, pharyngitis, and cervical adenitis syndrome), and tonsillar tumour (the last two accounted for 0.7% of all tonsillectomies meeting evidence-based criteria).



annual sore throats, and 13.9% [2129/15 320] of those meeting Paradise criteria.

The vast majority of children consulting with recurrent sore throats did not undergo tonsillectomy; however, the small proportion that did accounted for most tonsillectomies (Figure 1). The indications most likely to be followed by tonsillectomy were sleep apnoea, 22.2% [706/3185], followed by peritonsillar abscess, 14.8% [100/675], and sleep disordered breathing, 14.8% [2246/15 205] (Table 2).

Annual incidence of tonsillectomy

The crude annual incidence of tonsillectomy was 2.5 per 1000 person-years. It followed a broadly similar pattern to the incidence of indications, declining from 2005 to 2011 and then remaining relatively stable (Table 1). Age adjustment had little effect on trends or rates. Annual English hospital-reported tonsillectomy rates showed the same temporal pattern as the authors' primary care data.

Indications for tonsillectomies undertaken from 2005 to 2016

From 2005 to 2016, 11.7% [2144/18 281] of tonsillectomies had evidence-based indications; 99.3% of these met the Paradise criteria. Tonsillectomies without an evidence base were mainly for sore throats: five to six (12.4%), two to four (44.7%), or one (9.9%) within a single year. In addition, 3.9% were for sleep apnoea, and 12.3% for other sleep disordered breathing.

The proportion of tonsillectomies attributable to Paradise criteria, five or six annual sore throats, or to other sleep disordered breathing changed little. The proportion attributable to obstructive sleep apnoea increased fourfold, from 1.2% to 5.5% (Figure 2).

DISCUSSION

Summary

About four in 1000 children met evidence-based criteria for tonsillectomy annually between 2005 and 2016. The vast majority had recurrent sore throat consultations meeting Paradise criteria. Fewer than one in seven underwent surgery.

Two or three children in 1000 underwent tonsillectomy annually between 2005 and 2016. Fewer than one in eight had evidence-based indications. The proportion did not change over 12 years. In the UK, 32 500 of the 37 000 childhood tonsillectomies in 2016–2017 were therefore unnecessary.^{2,6} Most (54.5%) tonsillectomies were carried out on the very large numbers of children who consulted with one to four sore

(not shown in Table 1, information available from authors on request).

Between 2005 and 2016, the average annual incidence of meeting at least one evidence-based indication for tonsillectomy in children was 4.2 per 1000 person-years. A much larger number of children consulted with other potential indications for tonsillectomy that did not meet evidence-based criteria, particularly with one, two, or three to four sore throats in a year (Table 2).

Frequency of tonsillectomy in children with indications

In all, 13.6% [2144/15 760] of children with an evidence-based indication underwent tonsillectomy. Likelihood of undergoing tonsillectomy increased with frequency of sore throat consultations in a single year — 3.2% [5503/170 687] with three to four sore throats, 8.9% [2266/25 420] with five to six

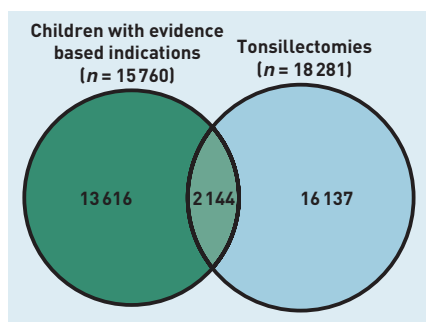


Figure 3. Relationship between number of children meeting evidence-based criteria (Paradise criteria, PFAPA, or tonsillar tumour) for tonsillectomy, and numbers of children undergoing tonsillectomy, 2005 to 2016.

throats in a year, but the vast majority of these children do not undergo or require tonsillectomy. The mismatch between children meeting evidence-based criteria and those undergoing tonsillectomy is shown in Figure 3.

Strengths and limitations

The authors' findings are obtained from a very large dataset reflecting current UK clinical practice over 12 years and capture both free NHS and private tonsillectomies. The tonsillectomy rates correlated closely with childhood tonsillectomy rates reported in England Hospital Episode Statistics ($r = 0.896$).

The authors identified likely indications for 95.2% of tonsillectomies from clinically coded consultations. Consultations in primary care are 15 times more common than in emergency departments, and upper respiratory infections are uncommon in the latter; therefore, primary care records will miss few relevant consultations.^{32,33}

Paradise criteria require specific documentation of sore throats and their clinical features. The authors' broad (sensitive) definition of a sore throat, counting any URTI consultation as a sore throat episode, may overestimate the frequency of evidence-based indications. In sensitivity analyses they investigated the effect of using an even broader (more sensitive) definition to include any consultation without a clinical code where antibiotics consistent with a sore throat episode were prescribed (penicillin V, erythromycin, or clarithromycin). This increased the number of evidence-based tonsillectomies to 17.5%. The authors then used a narrower (more specific) definition of a sore throat, including only those clinically coded as sore throat episodes. This reduced the proportion of evidence-based tonsillectomies to 4.4%, reduced the proportion of tonsillectomies attributable to sore throat to 70.9%, and increased the proportion without an identifiable indication to 11.1%. In all scenarios, only a minority of tonsillectomies were evidence-based and, even with the narrowest definition of sore throat, only a minority (32.0%) of children meeting Paradise criteria underwent tonsillectomy.

For sore throat-related indications the authors initially intended to consider tonsillectomy to be indicated for only 1 year after the patient last consulted for the indication. But median time from indication to tonsillectomy was 356 days, and applying a 1-year time limit for indications meant the authors were unable to identify

any indications for an additional 13% of tonsillectomies. Therefore, they identified the best ever indication rather than indications within 1 year before tonsillectomy: this may overestimate the frequency of evidence-based indications.

Some may consider there is sufficient evidence to support tonsillectomy for other indications. Children affected by recurrent otitis media may benefit modestly from adenotonsillectomy, although it is unclear if tonsillectomy adds to the benefits of adenoidectomy.³⁴ Tonsillectomy may be beneficial for sleep apnoea confirmed by polysomnography in 5–9 year olds, for peritonsillar abscess, or for psoriasis.^{19,20,25} Others conclude the evidence does not support tonsillectomy in PFAPA.³⁵ But a combination of evidence-based indications, or breathing-related indications, or peritonsillar abscess, accounts for only 28.4% of tonsillectomies. Furthermore, most children with any of these indications do not undergo tonsillectomy. Using a broader definition of eligibility for treatment increases the proportion of tonsillectomies that can be considered indicated, but decreases the proportion of eligible children who undergo surgery.

Comparison with existing literature

This is the first ever study to estimate the incidence of evidence-based indications for tonsillectomy in children and the proportion of affected children who undergo the procedure. It is the first study to comprehensively estimate the proportion of tonsillectomies that are evidence-based. A study in 23 self-selected UK general practices found one-quarter of 237 tonsillectomies in the late 1990s met evidence-based criteria.³⁶ A larger analysis suggested <1% of tonsillectomy patients in 2008 met Paradise criteria.³⁷ However, this study probably underestimated eligibility as it required sore throats to be precisely coded in general practice records.

Although others report rising hospital admissions for peritonsillar abscess, the authors of the current study found primary care consultations for peritonsillar abscess and for recurrent sore throat consistently declined over the same period.³⁸ This suggests a changing pattern of presentation rather than an increase in incidence.

The authors found UK tonsillectomy rates changed little from 2005 to 2016, with a slight decline in the years to 2011, followed by a modest increase. By comparison, in Germany, childhood tonsillectomy rates decreased by 17.3% from 2010 to 2013, but rates remain twice those in the UK.³⁹

The authors found an increasing propensity for sleep apnoea consultations to result in tonsillectomy: sleep apnoea consultations increased by about half, but tonsillectomies for obstructive sleep apnoea increased fourfold. Overall, the authors' attribution of indications for childhood tonsillectomy — 78.5% sore throat, 16.2% obstructive symptoms, and 0.5% peritonsillar abscess — is comparable to a national UK audit which found 83.3%, 14.7%, and 0.4%, respectively.¹⁰ Fewer tonsillectomies could be attributed to sleep apnoea than the 25% suggested by UK professional bodies,⁴⁰ or the two-thirds reported from the US.^{41,42}

The authors found guideline discordant (overtreatment alongside possible undertreatment) clinical management of recurrent sore throat in the UK to be stable over many years. Overtreatment is an increasingly recognised phenomenon.^{43,44} Guideline discordant clinical management has been observed in relation to both statins and depression, and in the US has increased in relation to back pain and headache.^{45–48}

Implications for research and practice

The results of current trials of tonsillectomy for obstructive sleep disordered breathing are awaited.^{22–24} High quality randomised controlled trials are also needed to evaluate tonsillectomy for peritonsillar abscess, guttate, and chronic plaque psoriasis. The frequency of indications for tonsillectomy and evidence-based tonsillectomies should be investigated in countries with higher and lower tonsillectomy rates than the UK.

These findings have some practical implications for UK clinical practice. Because they are undertaken on children who do not benefit, most tonsillectomies may cause more harm than good. This is ethically dubious and not a good use of resources. Most children meeting evidence-based criteria do not undergo tonsillectomy. Therefore, it cannot be considered a necessity. Doctors should already be informing parents of the likely effectiveness of tonsillectomy, and should now also inform them that most children with either recurrent sore throats or sleep apnoea do not undergo tonsillectomy and have no need to.

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Ethical approval

All research using anonymised patient records from THIN had prior approval from the NHS South-East Multi-Centre Research Ethics Committee subject to independent scientific review. This study received THIN Scientific Review Committee approval (reference 15-003).

Provenance

Freely submitted; externally peer reviewed.

Competing interests

The authors have declared no competing interests.

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